بسم الله الرحمن الرحيم

عنوان المحاضرة: Malignant Tumors
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Neoplasm: is an abnormal growth of cells within the bone that may be benign or malignant (cancerous)

Points To Be Approached in Routine Radiology:

-View of x-ray -Age of the patient -Bone or bones involved
-Horizontal location of the lesion:
(Central - eccentric- intra cortical - juxta cortical - parosteal - soft tissue extension)
-Longitudinal Location in the Bone: (epiphyseal - metaphyseal - diaphyseal - end of long bone)
-Cortex: (thinned - expanded - penetrated - destroyed)
-Presence or absence of calcification -Medullary extension
-Transitional zone (the larger as it gets, the more the malignancy of the tumor)
-Margin -Soft tissue shadow -Periosteal reaction -Character -Behaviour

Patterns of Bone Destruction: 1-Geograhic 2-Moth eaten 3-Permeative

Classification of malignant bone tumors:

▪Primary ▪Secondary: The most common bone malignancy
-Tissue of origin: Bone, Cartilage, round cell, Fibrous
-Bony derived tumors: are derived from, osteoblasts or osteoclasts

	Benign	Malignant
Age group	Young	Different
Course	Slow	Progressive
Path. fracture	Rare	More common
Metastasis	No	Yes
G. Condition	Normal	Affected
Z. transition	Narrow	Wide
Cortex	Thinned, Thickened	Breached, destroyed
Medulla	No satellite lesions	Yes
Margin	Well defined	Ill defined

Malignant bone tumors:

Microscopic picture:

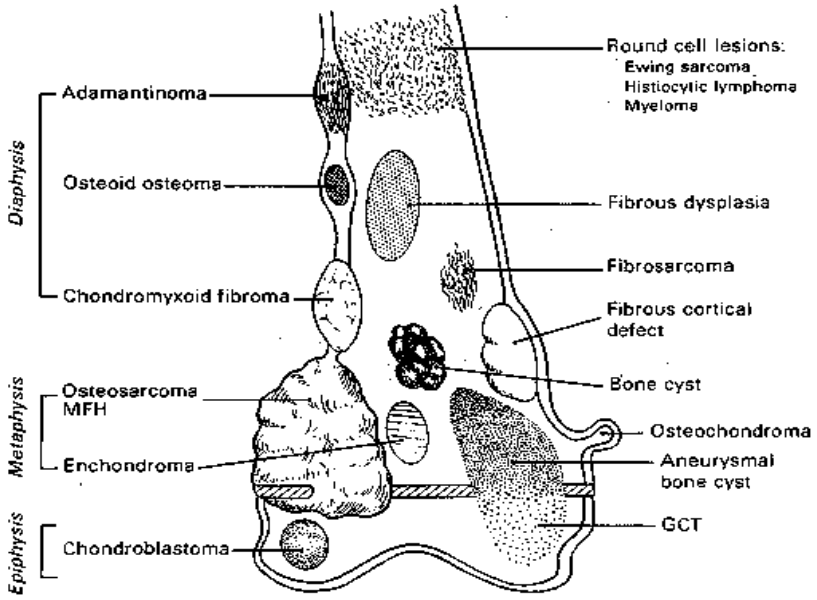
-Hyperchromatism -Pleomorphism
-Dark pyknotic nuclei

Diagnosis :

-Suspected from history & examination
-Made after the investigations
-Confirmed by Biposy

Investigations :

1- Laboratory: Biochemical + Markers
2- Imaging: for pattern, extent & spread
-Plain radiographs -CT - MRI
- Isotope bone scans - Angiographs



Information
-From imaging: tumor extent: ▪Intra-compartmental (1) ▪Extra-compartmental (2) ▪Metastasis (+)
-From biopsy: histological grading: ▪Low grade (A) ▪High grade (B)

Enneking System for Staging Benign and Malignant Musculoskeletal Tumors:

A) Benign			
1-Latet	2-Active	3-Aggressive	
B) Malignant			
Stage	Grade	Site	Metastasis
IA	Low	Intracompartmental	None
IB	Low	Extracompartmental	None
IIA	High	Intracompartmental	None
IIB	High	Extracompartmental	None
III	Any	Any	Regional or Distant

1-Giant Cell Tumor:

-Age group: 20-40 years

-Radiographs: Soap bubble appearance and thin adjacent cortex

-Arises in epiphysis of long bones

-Over 50% occur around knee joint (distal femur and proximal tibia). Also found in proximal humerus and distal radius

-Microscopically, composed of 2 elements:

▪Mononuclear cells: the neoplastic component of the neoplasm. They are round to spindle-shaped cells, and have vesicular nuclei.

▪Multinucleated giant cells: The reactive component of the neoplasm. They contain a huge number of vesicular nuclei (100 or more) and are evenly distributed in the neoplasm.

-Treatment: depends on the tumor being; benign, locally aggressive, malignant

-Biologic behavior: Is unpredictable. Majority of recurrences are common after simple curettage sarcomatous change may occur and occasionally metastases to the lung may occur

2-Osteosarcoma:

-The most common 1ry malignant bone tumor (20%) -Most common in 2nd decade

-Male: Female = 3:2 -Usually in metaphysis of long bones (Knee)

-Trauma may bring attention to lesion -Variable degrees of malignancy

♦*Primary (Classic or Conventional) Osteosarcoma*:

-*Age:* It occurs during the second decade of life. -*Sex:* Males are more affected than females

-*Sites*: It arises in the metaphyseal ends of long bone, around knee joint (proximal tibia and distal femur) arises de novo from a previously normal bone

-*Grossly*, Tumor is present at metaphyseal end of long bone. Is fusiform, gray-white, often showing hemorrhage and cystic softening. Bone necrosis associated with new bone formation especially noticed in the subperiosteal area

-Osteosarcoma is highly aggressive, it destroys the cortex extending inwards into the medullary cavity and outwards into the adjacent soft tissue. It rarely involves the joint cavity, usually the epiphysis is spared

-Imaging:

●*Plain radiograph*

▪Poorly defined ▪Alternating osteolysis & bone formation

▪Sunburst appearance: extension with ossification ▪Codman's triangle: subperiosteal

●*CT:* local extent ●*MRI:* local extent & skip lesion

●Isotope scans: skip lesion, local & systemic assessment

-Management: After Biopsy & Staging

Treatment Objectives: -Control the tumor -Avoid recurrence -Avoid metastasis

Surgery + Therapy *Chemotherapy in cycles starting before surgery*

Surgery

1-Amputation

2-Limb saving surgery

a-Resection

b-Reconstruction

▪Custom made prosthesis ▪Resection arthrodesis (Allograft - Skin cover - Rotationplasty)

Prognosis: survival rate: ▪In the 60's: 20% ▪In the 80's: 50% ▪Current: 70% +

3-Metastatic Bone Tumors:

-The most common malignant bone tumors -The incidence is underestimated (12 , 30 , 70%)

-Most patients are showing more than one site -Single site is found in less than 10% of the patients

-Bone seeking cancer:

▪Thyroid ▪Breast (the commonest in females) ▪Lung ▪Kidney ▪Prostate (the commonest in males)

▪Others e.g. (G.I. tumors - Skin - Cervix)

-Common sites for metastasis:

▪Spines (lumbar & thoracic) ▪Pelvis ▪Proximal femur ▪Ribs ▪Skulls

NB: Metastasis uncommon distal to elbow & knee. When present, think of lung cancer

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4-Chondrosarcoma:

-It is malignant cartilage producing tumor that may arise de novo or secondary to other lesions; multiple enchondroma, osteochondroma

-Criteria:

1-Common at adults 2-More common in males 3-More common at axial locations

4-Fluffy cotton appearance 5-Areas of calcification 7-Chemo and radioresistant

8-Limb salvage is the solution

5-Ewing Sarcoma:

-Criteria:

▪Primitive neuroectodermal tumor that arises from small round blue cells

▪Second most common primary bone tumor in children ▪M:f= 3:2

-Theories: ▪Neuroectodermal differentiation ▪Classic 11:22 chromosomal translocation

-Clinically:

▪Age: 5-15 years ▪Pain, swelling (huge), fever and redness (mixed with infection)

▪Increased ESR, LDH, WBCs

-Radiology:

▪Diaphyseal or pelvic or at scapula ▪Onion skin appearance of the Periosteal reaction

▪Poorly marginated and permeated ▪Extensive soft tissue shadow

-Treatment:

▪Local control by external beam radiation, neoadjuvant chemotherapy and limb salvage

▪Postoperative radiation

D.D of epiphyseal lesions: 1-Benign chondroblastoma 2-GCT 3-Clear cell chondrosarcoma

D.D. of diaphyseal lesions:

1-Ewing sarcoma (age 5-25) 2-Lymphoma (adult) 3-Fibrous dysplasia (age 5-30)

4-Adamantinoma (consider in the tibia) 5-Histiocytosis (age 5-30)

D.D. for Lesions of the Spine:

A) Older than 40 Years: 1-Metastases 2-Multiple myeloma 3-Hemiangioma 4-Chordoma (in sacrum)

B) Younger than 30 Years: 1-Vertebral Body (Histiocytosis - Hemangioma)

2-Posterior Elements (Osteoid osteoma - Osteoblastoma - Aneurysmal bone cyst)

D.D. of multiple lesions:

1-Histiocytosis 2-Enchondroma 3-Osteochondroma 4-Fibrous dysplasia

5-Multiple myeloma 6-Metastases 7-Hemangioma 8-Infection 9-Hyperparathyroidism